Claims

1. An actuator, in particular for valves, relays, or the like, with an electromagnet (10), which has a magnet coil (11), a magnet armature (12) that can be slid between two end positions, and a magnet yoke (13), and with an actuation tappet (14) driven by the magnet armature (12), characterized in that the electromagnet (10) is embodied so that its magnet armature (12) has a stable middle position, which is disposed between the two end positions and can be approached from the two end positions by supplying current to the magnet coil (11), and that at least one bistable mechanical locking mechanism (15), which comes into play in the end positions, acts on the magnet armature (12) or on the actuation tappet (14).

2. The actuator according to claim 1, characterized in that the magnet armature (12) is inserted with its two armature ends (121, 122) through mutually aligned insertion openings (17, 18) in the magnet yoke (13) and that the length of the magnet armature (12) and the embodiment of the magnet yoke (13) are matched to each other so that in each end position of the magnet armature (12), one of the armature ends is inserted maximally into the associated insertion opening (17, 18) in the magnet yoke (13) and the other is inserted minimally into the associated insertion opening (17, 18).

3. The actuator according to claim 2, characterized in that the magnet yoke (13) is U-shaped, with two yoke legs (132, 133) connected by means of a yoke bridge (131) and that the two insertion openings (17, 18) for the armature ends (121, 122) of the magnet armature (12) are disposed in the opposing yoke legs (132, 133).

4. The actuator according to claim 3, characterized in that the magnet coil (11) is wound onto a hollow cylindrical coil body (16), which is embraced between the yoke legs (132, 133) of the magnet yoke (13) so that the coil axis is aligned with the normals of the insertion openings (17, 18), and in that the magnet armature (12) is guided so that it can move axially in the coil body (16).

5. The actuator according to claim 3 or 4, characterized in that the maximal insertion depth of the armature ends (121, 122) is slightly greater than the width of the yoke legs (132, 133) extending in the axial direction of the magnet armature (12).

6. The actuator according to one of claims 1 to 5, characterized in that the magnet coil (11) is supplied with current by means of current pulses, whose duration is determined so that with the end of one current pulse, the magnet armature (12) being moved out of its end position has approximately reached its middle position and the energy stored in the magnet armature (12) is sufficient to drive the magnet armature (12) past the middle position, into its other end position.

7. The actuator according to one of claims 1 to 6, characterized in that the locking mechanism (15) is embodied as a detent locking mechanism (21).

8. The actuator according to one of claims 1 to 6, characterized in that the locking mechanism (15) is embodied as a snap switch mechanism (26), which after a slack point position is passed, exerts a drive force on the magnet armature (12) or actuation tappet (14).

9. The actuator according to claim 8, characterized in that the snap switch mechanism is embodied as a split spring washer (19).

10. The actuator according to claim 1, characterized in that two locking mechanisms (15) are provided.

11. The actuator according to claim 1 or 8, characterized in that there is at least one guide element (50) so that the magnet armature (12) is guided by the at least one guide element (50) and the locking mechanism (15).

12. The actuator according to claim 1, characterized in that the actuator (1) has two locking mechanisms (15) and that the magnet armature (12) is guided by the locking mechanisms (15).

13. The actuator according to claim 1 or 8, characterized in that the actuation tappet (14) has a valve plate (55), which opens or closes an opening (57) in a housing (59).

14. The actuator according to claim 1, characterized in that the actuator (1) is part of a tank ventilation system.

15. The actuator according to one or more of claims 1, 7, 8, or 10 to 12, characterized in that the locking mechanism (15) is a leaf spring (19).

16. The actuator according to claim 15, characterized in that the leaf spring (19) has at least one spring element (52).

17. The actuator according to claim 15, characterized in that the leaf spring (19) is comprised of two mirror-inverted S sections connected to each other.